Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PING HUA

Appeal No. 1999-0487
Application 08/554,425

ON BRIEF

Before JERRY SMITH, BARRETT and FLEMING, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-8, which constitute all the claims in the application.

The disclosed invention pertains to the field of image processing. Specifically, the invention relates to a method and apparatus for automatically determining an appropriate

quantization factor for use in JPEG compression of the image data so as to achieve a desired average compression ratio for the data. The inventors claim to have discovered that certain types of image data sequences bear a relationship which allows the quantization factor to be determined using linear interpolation based on a low quantization value and a high quantization value.

Representative claim 1 is reproduced as follows:

> 1. A method for automatically determining, for a desired average compression ratio C, and within a predetermined range of quantization values, an appropriate value for a quantization factor Q for use in JPEG compression of image data from a sequence of angiographic images made up of frames of video data, comprising the following steps:
>
> sampling N frames of video data from the sequence;
>
> determining, using a low value quantization factor Q that is within said predetermined range and that is assumed to be less than said appropriate value, a lower average compression ratio for the sampled N frames of video data;
>
> determining, using a high value quantization factor Q that is within said predetermined range and that is assumed to be greater than said appropriate value, a higher average compression ratio for the sampled N frames of video data; and

determining said appropriate value by linear interpolation.

The examiner relies on the following references:

Greenberg	3,908,081	Sep. 23, 1975
Yonekawa et al. (Yonekawa)	4,922,273	May 01, 1990
Chen et al. (Chen)	5,241,383	Aug. 31, 1993
Daher	5,327,254	July 05, 1994
Mita et al. (Mita)	5,543,844	Aug. 06, 1996
		(filed Nov. 09, 1993)

Wallace, "The JPEG Still Picture Compression Standard," IEEE Transactions on Consumer Electronics, Vol. 38, No. 1, February 1992, pages xviii-xxxiv.

The following rejections are on appeal before us:

1. Claims 1, 5, 7 and 8 stand rejected under 35 U.S.C. § 103 as being unpatentable over the teachings of Mita in view of Yonekawa.

2. Claim 2 stands rejected under 35 U.S.C. § 103 as being unpatentable over the teachings of Mita in view of Yonekawa and further in view of Chen.

3. Claims 3 and 4 stand rejected under 35 U.S.C. § 103 as being unpatentable over the teachings of Mita in view of Yonekawa and further in view of Daher and Wallace.

4. Claim 6 stands rejected under 35 U.S.C. § 103 as being unpatentable over the teachings of Mita in view of Yonekawa and further in view of Greenberg.

Rather than repeat the arguments of appellant or the examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellant's arguments set forth in the brief along with the examiner's rationale in support of the rejection sand arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in claims 1-8. Accordingly, we reverse.

In rejecting claims under 35 U.S.C. § 103, it is

incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467
(1966), and to provide a reason why one having ordinary skill in

the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed.

Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472,

223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellant have been considered in this decision. Arguments which appellant could have made but chose not to make in the brief have not been considered [see 37 CFR § 1.192(a)].

We consider first the rejection of independent claims 1, 5, 7 and 8 based on the teachings of Mita and Yonekawa. Appellant has indicated that claims 1 and 7 stand or fall

together as a first group while claims 5 and 8 stand or fall together as a second group [brief, page 3]. The examiner makes a single rejection which is applied against each of claims 1, 5, 7 and 8.

The examiner essentially finds that Mita teaches the claimed invention except that Mita uses a code amount or relative code amount as a compression factor rather than the claimed compression ratio. The examiner asserts that it would have been obvious to the artisan to use a compression ratio instead of a code amount or relative code amount. The examiner also cites Yonekawa as teaching use of a compression ratio to determine quantization values [answer, pages 4-5].

With respect to claims 1 and 7, appellant notes that these claims recite a sequence of angiographic images made up of frames

of video data, and appellant argues that neither Mita nor Yonekawa relates to angiography image sequences. Appellant also argues that neither reference teaches the concept of using linear interpolation to automatically determine quantization factors to achieve a desired compression ratio

[brief, pages 5-6].

The examiner's response indicates that the examiner considers the invention to be nothing more than a recognition that the quantization factor in a JPEG compression is related to the compression ratio. According to the examiner, the method claimed by appellant would work on any image data despite appellant's assertions to the contrary. The examiner also argues that appellant's invention is not limited to angiographic image sequences despite the specific recitation of such sequences in claims 1 and 7 [answer, pages 8-13].

The examiner's finding that claims 1 and 7 are not limited to angiographic image sequences is clearly in error. Claims 1 and 7 specifically recite that the method is applied to "image data from a sequence of angiographic images made up of frames of video data." Although this recitation appears in what the examiner calls the preamble of the claim, and is not binding

according to the examiner, the steps of claims 1 and 7 refer to "sampling N frames of video data from the sequence" and

determining a value "for the sampled N frames of video data." The sequence and the sampled frames of these claims clearly refers back to the sequence of angiographic images set forth in the preamble of the claim. Therefore, claims 1 and 7 give life to the preamble and require that the image data be a sequence of angiographic images. The fact that appellant's specification indicates that the invention is not limited to angiographic images cannot alter the clear language of claims 1 and 7 which restricts the data to a sequence of angiographic images.

More importantly, appellant's invention is based on the discovery that sequential angiographic images and certain other types of images have the unusual property that within a predetermined range of quantization values, the average compression ratio varies linearly with respect to the quantization factor. Contrary to the examiner's assertion, this relationship does not exist for all sequential image data. It is the discovery of this relationship with respect to certain types of image data which allows a quantization value to be determined

using linear interpolation to achieve a desired compression ratio. The claimed invention would be useless if applied to image data which did not have this relationship. Therefore, the type of image data is critical in evaluating the claimed invention.

Thus, the angiographic image sequences of claims 1 and 7 are critical to the method recited in those claims. The examiner has failed to demonstrate that the prior art teaches or suggests the performance of the specific method recited in claims 1 and 7 with respect to angiographic image sequences as recited in these claims. The linear interpolation discussed in the applied prior art has nothing to do with interpolating between two quantization values having the relationship that angiographic image sequences have as recited in claims 1 and 7. Therefore, we do not sustain the examiner’s rejection of claims 1 and 7.

With respect to claims 5 and 8, appellant argues that the relationship between quantization factor and average compression ratio as claimed is critical to the performance of the claimed method and the applied prior art does not teach or suggest this relationship as discussed above. The examiner

disagrees.

Claims 5 and 8 differ from claims 1 and 7 in that instead of reciting that the image data is from a sequence of angiographic images, the image data is recited as being "of a type wherein, within a predetermined domain that includes said range, average compression ratio varies linearly with respect to quantization factor." As noted above, it is this property of the image data which is critical to the claimed method. Angiographic image sequences have this property. Neither Mita nor Yonekawa teaches or suggests that image data exists which has the claimed relationship. Without recognition of this relationship, the applied prior art does not teach or suggest that a quantization factor can be determined using linear interpolation between just two values to achieve a desired compression ratio. Therefore, we also do not sustain the examiner's rejection of claims 5 and 8.

Although dependent claims 2-4 and 6 are rejected using the additional teachings of Chen, Daher and Wallace, or Greenberg, none of these additionally applied references

overcomes the basic deficiencies of the Mita-Yonekawa combination discussed above. Therefore, we also do not sustain the rejection of these dependent claims.

In summary, we have not sustained any of the examiner's rejections of the appealed claims. Therefore, the decision of the examiner rejecting claims 1-8 is reversed.

REVERSED

JERRY SMITH Administrative Patent Judge	)	
LEE E. BARRETT Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
MICHAEL R. FLEMING Administrative Patent Judge	)	

js/vsh

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